GEPHE SUMMARY

Gephebase Gene
mucilage-modified 2 (mum2) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^mucilage-modified 2 (mum2)^#gephebase-summary-title)

GepheID
GP00001275

Entry Status
Published

Main curator
Arnoult

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Mucilage (seeds) (https://www.gephebase.org/search-criteria?/and+Trait=^Mucilage (seeds)^#gephebase-summary-title)

Trait State in Taxon A
Arabidopsis thaliana- Col-0 and other lines

Trait State in Taxon B
Arabidopsis thaliana- Sus-1

Ancestral State
Data not curated

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Arabidopsis thaliana- Col-0 and other lines

Taxon B

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Arabidopsis thaliana- Sus-1

GENOTYPIC CHANGE

Generic Gene Name
BGAL6

Synonyms
beta-galactosidase 6; BGAL6; MBK5.28; MBK5_28; MUCILAGE-MODIFIED 2; At5g63800

String
3702.AT5G63800.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT5G63800.1)

Sequence Similarities
Belongs to the glycosyl hydrolase 35 family.

GO - Molecular Function
GO:0004565 : beta-galactosidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004565)

GO - Biological Process

UniProtKB Arabidopsis thaliana
Q9FFN4 (http://www.uniprot.org/uniprot/Q9FFN4)

GenebankID or UniProtKB
836500 (https://www.ncbi.nlm.nih.gov/nuccore/836500)

GO:0005975 : carbohydrate metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0005975)
GO:0048354 : mucilage biosynthetic process involved in seed coat development
(https://www.ebi.ac.uk/QuickGO/term/GO:0048354)
GO:0009827 : plant-type cell wall modification
(https://www.ebi.ac.uk/QuickGO/term/GO:0009827)

GO - Cellular Component

GO:0005773 : vacuole (https://www.ebi.ac.uk/QuickGO/term/GO:0005773)
GO:0048046 : apoplast (https://www.ebi.ac.uk/QuickGO/term/GO:0048046)
GO:0005618 : cell wall (https://www.ebi.ac.uk/QuickGO/term/GO:0005618)

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title)

SNP Coding Change

Nonsense

Molecular Details of the Mutation

G->C @position 2240 causing premature stop

Experimental Evidence

Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Local evolution of seed flotation in Arabidopsis. (2014) (https://pubmed.ncbi.nlm.nih.gov/24625826)

Authors

Saez-Aguayo S; Rondeau-Mouro C; Macquet A; Kronholm I; Ralet MC; Berger A; SallÃ© C; Poulain D; Granier F; Botran L; Loudet O; de Meaux J; Marion-Poll A; North HM

Abstract

Arabidopsis seeds rapidly release hydrophilic polysaccharides from the seed coat on imbibition. These form a heavy mucilage layer around the seed that makes it sink in water. Fourteen natural Arabidopsis variants from central Asia and Scandinavia were identified with seeds that have modified mucilage release and float. Four of these have a novel mucilage phenotype with almost none of the released mucilage adhering to the seed and the absence of cellulose microfibrils. Mucilage release was modified in the variants by ten independent causal mutations in four different loci. Seven distinct mutations affected one locus, coding the MUM2 Î²-D-galactosidase, and represent a striking example of allelic heterogeneity. The modification of mucilage release has thus evolved a number of times independently in two restricted geographical zones. All the natural mutants identified still accumulated mucilage polysaccharides in seed coat epidermal cells. Using nuclear magnetic resonance (NMR) relaxometry their production and retention was shown to reduce water mobility into internal seed tissues during imbibition, which would help to maintain seed buoyancy. Surprisingly, despite released mucilage being an excellent hydrogel it did not increase the rate of water uptake by internal seed tissues and is more likely to play a role in retaining water around the seed.

Additional References

RELATED GEPHE

Related Genes

2 (PER36, PMEI6) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Mucilage/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

4 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^mucilage-modified 2 (mum2)^/and+Taxon ID=^3702^/or+Gene Gephebase=^mucilage-modified 2 (mum2)^/and+Taxon ID=^3702^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

Another null allele of MUM2 already found in 18165330